

### REMARKS

Claims 1, 3-8 are pending. Claims 1 and 4 are amended, with no new matter being added thereby. Claim 2 is canceled. Applicant requests reconsideration and reexamination of the pending claims.

Claims 1-8 are rejected under 35 U.S.C 103(a) as being unpatentable over *Zhu et al.* (2003/0141826, hereinafter "*Zhu*"). The Examiner stated that "*Zhu et al* do not disclose applicant's claimed range of  $R/r \geq 3.4$ ," where  $R$  is an internal diameter of the outer tube and  $r$  is an external diameter of the main tube part....However, it has been held that where general conditions of the claim are discovered in the prior art, discovering the optimum or workable range involves only routine skill in the art." Applicant overcomes the rejections as follows:

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.) See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

MPEP §2144.05 (II)(B) (underline added)

The inventors of the present application faced the following unexpected problem with arc tubes designed to satisfy the relational expression of  $L/D \geq 4$  in order to obtain high luminous efficiency: due to a rise in the lamp voltage, some of the arc tubes "burn-out" during their rated life.

The inventors who analyzed and investigated the cause found that an arc gradually shifts closer to the internal surface of the arc tube during illumination, which causes the

temperature of ceramic, a constituent material of the arc tube, to become far greater than expected. As a result, the ceramic reacts with the enclosed metal halides, which leads to an increase in liberated iodine. The problem with the increase in liberated iodine, is that it causes a rise in the lamp voltage, which in turn causes the arc tube to prematurely "burn-out."

The present invention has been made in view of these findings, and is characterized especially by satisfying the relational expression of  $3.4 \leq R/r \leq 7.0$ . The significance of the relational expression to the invention is made evident throughout the specification and figures, for example, on page 16, line 19 through page 17, line 3.

In contrast, *Zhu* did not recognize that luminous efficiency is a function of the expression of  $3.4 \leq R/r \leq 7.0$ , and therefore Applicant's findings regarding the ratio  $R/r$  was not recognized in the art to be a result-effective variable.

Although *Zhu* satisfies the relational expression of  $L/D \geq 4$  and discloses that the mercury is sealed at or less than a density of 4 mg/cc, *Zhu* is not concerned with the problem of an increase in liberated iodine causing a rise in the lamp voltage, which in turn causes the arc tube to prematurely burn-out. In addition, *Zhu* fails to address the problem that the vapor pressures of the enclosed metals vary in accordance with the setting of the mercury density, which further causes variation of color temperature. The present invention solves each of these problems by satisfying the relational expression of  $3.4 \leq R/r \leq 7.0$ .

As described above, the present invention satisfying the relational expression of  $L/D \geq 4$  and solves the above-mentioned problems caused under the condition with a mercury density of 4.0 mm/cc or less, which are not addressed by *Zhu*, by satisfying the relational expression of  $3.4 \leq R/r \leq 7.0$ .

Accordingly, since *Zhu* fails to teach or suggest the relational expression  $3.4 \leq R/r \leq 7.0$ , as a variable which achieves a recognized result, Applicant's discovery of the importance of such a relational expression is not made routine in view of *Zhu*. Accordingly, Claim 1 is

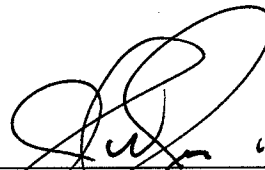
allowable.

Claims 2-8 depend from Claim 1 and are therefore allowable for at least the same reasons as Claim 1 as well as for the novel features which they add.

If the Examiner believes a telephone interview will help further the prosecution of the case, the undersigned attorney can be contacted at the listed phone number.

Very truly yours,

**SNELL & WILMER L.L.P.**



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